sperms, possessing a siphonostele with strong development of secondary wood, had uniseriate or linear rays, such as characterize the conifers. During the warmer climate of the Mesozoic, "sheets of storage tissue were built up from congeries of uniseriate rays about the persistent leaf traces of evergreen angiosperms. This primitive type of foliar ray has persisted in certain species of primitive families (Casuarinaceae, Fagales, etc.). Later changes in climate modified the storage conditions, and in the majority of living dicotyledons the aggregated units of foliar ray tissue have been diffused through the stem, and in general the evidence of their former relation to leaf traces has disappeared. In a small number of forms the primitive aggregate type has been "progressively compounded or solidified," and the result is the compound or multiseriate ray (deciduous oaks, etc.). In many families there has been a reversion to the primitive uniseriate condition. As a consequence, in the modern species the foliar ray of the primitive aggregate type has been or is being reduced, diffused, or compounded. The evidences of reduction are interesting and important in any scheme of classification. For example, *Castanea* and *Castanopsis* are reduced members of the oak family, and *Alnus mollis* and *A. acuminata* are reduced species of *Alnus*.

It is increasingly evident that the woody cylinder of angiosperms is very far from being a structure of phylogenetic simplicity.—J. M. C.

Bog vegetation.—In studying the various problems connected with the peat bogs of Ohio, DACHNOWSKI[18] has made a careful enumeration of the various plant associations involved, and traced the variously modified successions which occur. Fortunately he has not been content with observations, but has attempted various lines of quantitative study of the factors involved, such as the height and variation of the water table, the acidity of the soil, and the evaporating power of the air. He has also begun a series of chemical analyses of bog water and peat soils. The preliminary results[19] are valuable as being suggestive of lines for future investigation rather than as affording solutions for any existing problems. The chemical changes which take place in the transformation of vegetable matter into peat are only imperfectly understood, but as they are observed as exhibited in passing from the imperfectly formed fibrous material to the competely transformed structureless peat there is a relative loss of oxygen and hydrogen and an increase of carbon and nitrogen simultaneously with an increase in the reducing processes in the soils. The complexity of the problem of relating the vegetation to the chemical nature of the substratum is indicated, as well as the possible importance of the decomposition products of proteids and carbohydrates that are now beginning to be isolated and identified.—GEO. D. FULLER.

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[18] DACHNOWSKI, A., The succession of vegetation in Ohio lakes and peat deposits. Plant World **15**:25–39. 1912.

[19] ———, The relation of Ohio bog vegetation to the chemical nature of peat soils. Bull. Torr. Bot. Club **39**:53–62. 1912.